There appears to be little doubt that the heads under discussion on Stela B at Copan are intended to represent the blue macaw, while those on the buildings of northern Yucatan are but manifestations of the serpent that gives its proper character to Maya art. These somewhat ludicrous extremes in identification are reached by comparison with other Maya representations rather than by comparison with drawings made in China. In the first instance, it was arrived at independently by F. Parry in his "Sacred Maya Stone," a fanciful study written in 1893; by G. B. Gorden in "Conventionalism and Realism in Maya Art at Copan," 1909; by A. M. Tozzer and G. Allen in their "Animal Figures in Maya Codices," 1910; and by the present writer in his "Study of Maya Art," 1913.

Three drawings will serve to illustrate the point, all taken from Copan, and one from the back of Stela B itself. The first (*a*) is a full, round sculpture of a macaw head, in which the characteristic long upper bill, short under bill, and thick tongue are drawn rather realistically. The eye is surrounded by raised knobs, and below the eye there is a spiral formed by knobs. The nostril is seen in its proper position, and a line of demarcation appears along the lower edge of the upper bill. In (*b*) the left-hand half of the hieroglyph represents the same head, and it is to be noted that the under part of the upper bill is now differentiated from the upper part by cross-hatching When we come to *c* (the drawing is taken from the side, and shows details not visible on the front) we can trace all the parts shown in the two previous faces. The eye is surrounded by knobs, but the spiral below the eye is turned in the opposite direction. The nostril is in plain view, and parts of the under side of the upper bill are marked by cross-hatching. The lower bill and the tongue are lacking, but the omission of the lower jaw is very frequent in Maya drawings of animal heads. There is added, however, an ear, above which rises a flamboyant ornament. This detail of the ear with its ornament is unnatural, but is found, nevertheless, on most Maya drawings of reptile and bird heads. The Central American artists were not concerned only with the realism of natural motives, but having put in their drawing enough fact to identify the subject, they felt free to let their fancy range. Dr. Seler was not so absurdly mistaken as might be supposed in his suggestion of tortoise heads, because the Maya draw the head of this reptile very much as they do those of the macaw. The glyph for the day Kayab is now admitted to represent a bird's head, although previously explained as that of a tortoise.

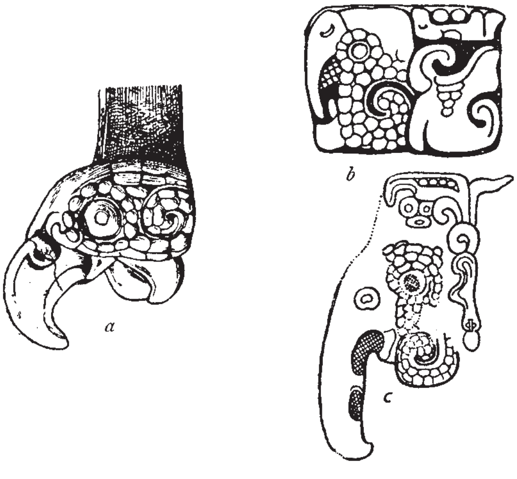

FIG. 1

That the heads with projecting snouts used as architectural decoration are connected with the concept of the snake rather than the elephant is easily proven by a study of homologous parts in a series of designs. Space forbids me to go into this subject, but I have already treated it rather fully in the paper referred to. As for the elephant-mound and the numerous "elephant-pipes," they have long since been discredited as regards the original identification, and not a few have been cast into the limbo of plain frauds.

It is not a mere difference of opinion upon rather minor details of archæology that prompts this reply to Dr. G. Elliot Smith's communication. It is because he ventures to draw conclusions of great importance as regards cultural connection between China and Mexico in ancient times from this tainted evidence. In dealing with the hydra-headed fallacy of Old World origins for New World civilisations it is necessary to cut off each head in turn with a searing sword.

HERBERT J. SPINDEN.

American Museum of Natural History,
December 18, 1915.

IN my second letter on this subject, which was published in NATURE on December 16 (p. 425), I have already dealt with the main point raised by Prof. Tozzer's letter; and since then I have presented to the Manchester Literary and Philosophical Society, for publication in its Memoirs, a detailed examination of the whole problem, with a series of illustrations and a full discussion of all the evidence. The account given in my memoir sheds a remarkable light upon the psychology of Americans, both ancient and modern, and especially upon the ethnological "Monroe doctrine," which demands that everything American belongs to America, and must have been wholly invented there. The Maya civilisation was American in origin only in the same sense that Harvard University is—immigrants from the Old World supplied the ideas and the technical knowledge, which enabled an institution to be built up, no doubt with certain modifications prompted by local conditions and the contact of a variety of cultural influences.

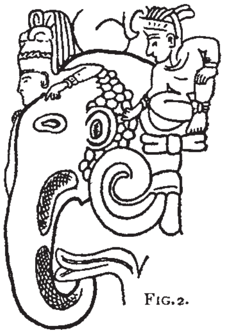

FIG. 2.

As it may be some time before my lengthy memoir can be published, I should like to refer to Prof. Tozzer's other arguments now.

Like the other American ethnologists, to whom I referred in my last letter, he lays great stress upon the fact that "the ornamental scroll beneath the eye" (see the figures taken from Spinden's monograph) is found both in the elephant- (*c*) and the macaw-sculptures (*a*) at Copan; and he uses that fact as an argument in favour of what I regard as the picture of an elephant having been intended for a macaw. Has it ever occurred to Prof. Tozzer to inquire into the origin and meaning of the scroll to which he attaches so much importance? If he will do so, he will learn that, so far from the elephant having borrowed the scroll from the macaw, the scroll was an essential part of the elephant-design before it left Asia, and, in fact, is found in conventionalised drawings of the elephant in the Old World from Cambodia to Scotland. There is no doubt whatever that there was a certain amount of confusion in the mind of the ancient American sculptor between the pictures of the elephant (*b* and *c*) and that of the macaw (*a*). Thus he provided the modern American ethnologist with an additional argument for refusing to admit that the sculptures *b* and *c*, as well as that which I reproduced in NATURE of November 25, and now repeat (Fig. 2), cannot have been intended for anything else than an elephant. Never having seen an elephant, and not being aware of its size, no doubt the Maya artist conceived it to be some kind of monstrous macaw; and his portraits of the two creatures mutually influenced one another. The geometrical pattern around the macaw's eye is an excellent conventialisation of the peculiar marking of the Central American macaw (Fig. 3): the pale area surrounding its eye occupies approximately an area relatively corresponding to the Indian elephant's pinna. The ear-ring often depicted (in Indian drawings) over the auditory meatus gives it an eye-like appearance. Is it any wonder, then, that the Maya artist should have taken the elephant's meatus (in a picture) for its eye, and have confused its pinna with the pale area on the macaw's head? Therefore, it was a natural thing to use the same convention for representing it as he had done in the case of the macaw. But the macaw's scroll was derived from the elephant-design. These and several other considerations, when the facts are set forth and examined in detail, as I have done in my memoir, make every stage in the history of the confusion so transparently clear that one can reconstruct the psychology of it with the utmost confidence. It is equally certain that the scroll below the ear, as well as the tree-like appendages above the head (shown in Fig. 1, *c*), are parts of the conventional waves breaking around the sea-elephant type of the Indian "Makara," which was the commonest form of the elephant spread abroad by the seamen of southern India, whence the great migrations started. This is admirably demonstrated also in the Scotch and Scandinavian pictures of elephants.

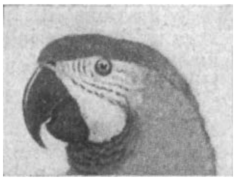

FIG. 3.—The Central American Macaw.

The Copan sculptor has provided the elephant with a new ear (Fig. 1, *c*), also modelled on the Makara's ear, and provided with a characteristically Cambodian pendant. If *c* was meant to be a macaw, why was it given a mammalian ear?

It is significant that the American ethnologists who entertain the macaw-hypothesis do not refer to the perfect example, which I have used (Fig. 2), but only to the cruder, damaged remains of the other Copan elephant (Fig. 1, *c*), in which the compromising turbaned-rider and his elephant-goad, as well as the distinctive profile of the Indian elephant's head, have been destroyed. In this sculpture also the artist was influenced to a greater degree than in the more perfect head (Fig. 2) by the macaw-design, and instead of restricting the geometrical pattern, as in the latter, to the area of the pinna, encircled the eye with it (*c*). This occurs in a more striking form in the glyph (*b*), to which Prof. Tozzer refers. In other respects, however, this also represents an unmistakable elephant.

Prof. Tozzer argues that Bancroft's drawings do not represent elephants, but the long-nosed god B. But the "long-nosed god" of the old codices is as unmistakable an elephant as the Copan sculpture is. As Prof. Stempell remarked, in reference to it (see my first letter), no zoologist can have any doubt that it was the artist's intention to represent an elephant —or, as I would prefer to put it, to copy the drawing of an elephant. In this case again the method of conventionalising the elephant, and especially his tusk, is a close parallel to the Cambodian prototype.

As to the so-called "elephant mound" and "elephant pipes," I may say that in my memoir I have not based any part of the argument upon them. If they are genuine, they are of trifling value as corroboration, in comparison with the consideration that the whole of the legends centred around the rain-gods of India and Mexico (NATURE, December 16) witness to the truth of the identification of the "long-nosed god B" as the elephant of Indra, who has been confused with Indra himself. If the pipes are forgeries —and I am not unaware of the literature relating to the point raised by Prof. Tozzer—the maker of them must have been one of the most remarkable archæologists America has yet produced.

I may add, in conclusion, that the evidence provided by these American pictures of the elephant is merely one link in the chain of connection between the early civilisations of the Old World and the New, which my collaborators and I are now putting together. It will be so strong that it can never be broken.

Out of the vast mass of proofs which we have now accumulated I selected the elephant-story for publication in NATURE, because the criticism that invariably is levelled at most of our other evidence cannot be used in this case. It is usually argued that even the most complex designs and the most fantastic customs and beliefs may be invented independently the one of the other in widely separated localities. But even the Maya artist, skilled as he was in conventionalising, could not invent the elephant, even by making a grotesque caricature of a macaw.

Since I posted the foregoing comments on Prof. Tozzer's letter, the Editor has kindly submitted Dr. Spinden's letter to me. With the previous instalment of my letter, so as to put the critics' case fairly before readers of NATURE, I sent the same three of Dr. Spinden's drawings which he has now submitted to illustrate his letter. My letter in NATURE of December 16, as well as my reply to Prof. Tozzer, cover most of the issues raised by Dr. Spinden.

These two distinguished interpreters of Central American art can decide between themselves what the Yucatan "heads with projecting snouts" were really intended to represent.

As for the real intentions of the Copan artists, I am quite content to leave it to the readers of NATURE to decide for themselves whether the sculpture reproduced on November 25, p. 340, and here repeated (Fig. 2), was or was not meant to depict an elephant with his Indian rider. If further corroboration is wanted, I might refer them to the manner of representing such a rider and his head-dress in early Indian and Cambodian sculptures; and as for the spiral ornament, which probably originated in the Indian representations of Makara, I might direct attention to the Cambodian and Chinese variations of the spiral, all of which reappear in Mexico and Central America. I would especially refer to Laufer's monograph on "Jade" (Chicago Field Museum of Natural History, 1912, pl. xliii.), where a perfect prototype of the Copan spiral is represented upon a jade ornament of the Han dynasty.

Dr. Spinden's refusal to admit that the Copan sculptures represent elephants becomes more intelligible when one reads the statement in his monograph on "Maya Art" that he "does not care to dignify by refutation the numerous empty theories of ethnic connections between Central America and the Old World" (p. 231). This is the attitude of mind not of the scientific investigator, but of the medieval theologian appealing to the emotions in defence of some dogma which is indefensible by reason.

G. ELLIOT SMITH.

The University, Manchester.

The Board of Education and Laboratory Work: A Correction.

ON p. 548 of NATURE (January 13) I stated that the Board of Education had suggested the substitution of lecture-demonstrations for laboratory work in schools. I have been informed that the apparently trustworthy information on which I relied was incorrect. It is satisfactory to be able to state authoritatively that the Board has made no such suggestion, nor was the Board responsible for the recent adoption of this form of retrenchment in certain schools.

G. F. DANIELL.

A TERRESTRIAL CRATER OF THE LUNAR TYPE.[1]

ALTHOUGH the memoir before us was read before the U.S. National Academy of Sciences so far back as six years ago, it has only recently been received, and it must always be regarded as a chief source of our information concerning one of the most striking features presented anywhere on the earth's surface. The author, who was one of the firm which obtained possession of the locality, has accumulated by persistent and accurate observation such a wealth of valuable information that his memoir will always remain of the highest scientific value.

Among the interesting phenomena revealed by the exploration of the western territories of the United States, none yield in importance to the remarkable ringed depression which received the name of "Coon Butte." Situated 70 miles from the famous Grand Canyon of the Colorado, and only $2\frac{1}{2}$ miles from the Canyon Diablo, with its innumerable scattered meteorites, the strata underlying all three localities are the same and are perfectly horizontal. These well-known strata consist of, 40 or 50 ft. of purplish-red sandstone, underlain successively by 250 to 300 ft. of limestone (carboniferous), and 1000ft. of white sandstone. Although these beds underlying the "butte" have been explored by numerous borings, neither in the strata themselves nor in the dark red sandstone rocks below them has the smallest indication of volcanic materials been met with; neither has the faintest trace of solfataric or other volcanic action been detected. The nearest scene of volcanic activity is found on a small scale nine miles away, and on a grander scale 40 miles farther. On the other hand, fragments of the famous "Canyon Diablo meteorite" (which contains diamonds with platinum and iridium) have been found in countless numbers in and around the "butte," and up to a distance of five miles around it.

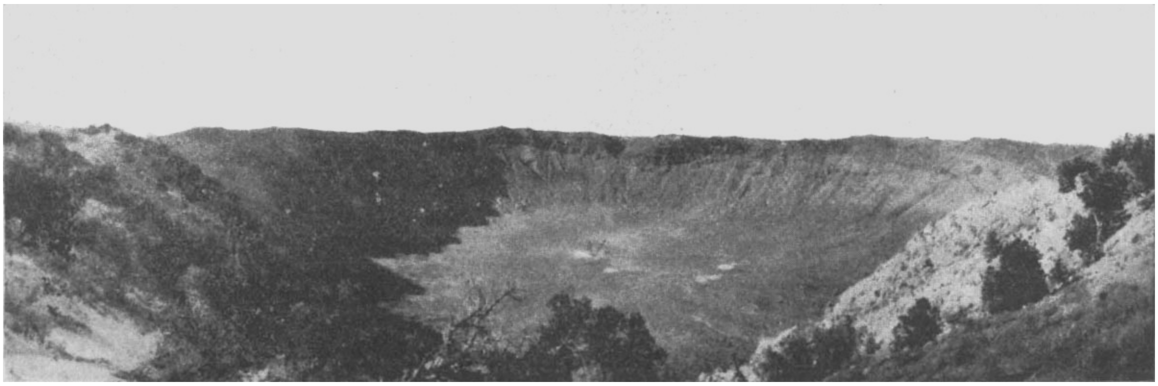

FIG. 1.—Interior view of crater, looking N.N.W.

The "crater" of Coon Butte is a depression, circular in form and about 4000 ft. in diameter, with a rim that rises 570 ft. above a floor, which is quite level except where obscured by talus from the rim. In this rim the limestone and sandstone rocks are seen to have undergone the most violent disturbance; they dip away from the centre at various angles up to 90°. For distances up to two miles from the "butte" ejected fragments of the strata are found, those of the limestone being great angular blocks up to thousands of tons in weight, while the sandstone is usually finely divided and often in a completely pulverised condition. The minute study of the ejected sandstones shows evidence of their having been subjected to most intense mechanical forces. In many cases the individual sand-grains are pulverised into a fine "silica-meal"; where, as generally happens, the original bedding planes are visible, they are seen to have been bent and twisted in the most striking manner, and in some cases a lamination cutting across the bedding planes has been induced strikingly similar to the cleavage of slaty rocks. More rarely fusion of the silica has taken place, and portions of the original sand-grains are involved in chalcedony, a pumice-like material being formed which floats in water.

Scattered among the other ejected fragments as well as in the "butte" itself are numerous examples of what the author calls "shale-balls," by others, perhaps more appropriately, designated

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[1] "Meteor Crater (formerly called Coon Mountain or Coon Butte) in Northern Central Arizona." By D. M. Barringer. Paper read before the U.S. National Academy of Sciences.